

# DNR TANKS Update

Iowa Department of Natural Resources  
Underground Storage Tank Section

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## 3 Tiers in Iowa RBCA

The guidance and software are finally done, so people can move ahead with RBCA (risk-based corrective action, "Rebecca"). Three-tiers of assessment are used so sites causing little or no risk to health or environment can "get out" with less assessment and cost.

### Tier 1

The main idea of Tier 1 is to identify the maximum contamination with a limited assessment. At least three monitoring wells are required:

- ⊗ one at each tank basin
- ⊗ one at the pump islands
- ⊗ one downgradient

More may be needed depending on how bad contamination is along piping or at spills.

The maximum is then compared to the Tier 1 Table (on page 6.) If the maximum is less than the Tier 1 Table OR if the pathway is not complete, you pass that pathway. (Refer to page 4 for an explanation of pathways.)

**For example**, let's look at just groundwater pathways for benzene. Let's say your site has a maximum of 1,000 ppb.

*Ingestion*: pass (not complete—no drinking or nondrinking wells within 1,000 feet and no protected groundwater)

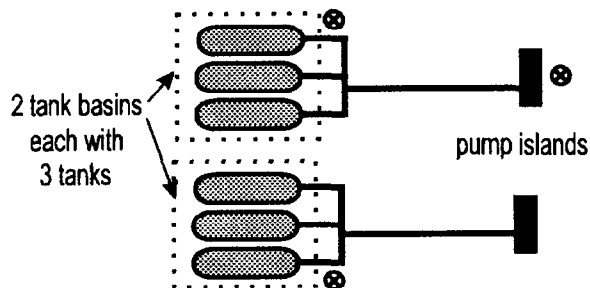
*Vapor*: pass (1,000 ppb is less than 1,540 ppb from Tier 1 Table)

*Plastic water line*: fail (plastic water line 100 feet away) AND 1,000 ppb exceeds 290 ppb from Tier 1 Table)

*Surface water*: pass (no surface water within 200 ft.) (See p. 2)

### Tier 1 Example

- ⊗ Monitoring wells to find maximum



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## Options after Tier 1

For any pathways that fail Tier 1, a Tier 2 must be done OR one of the following options.

For our example:

✗ replace or move plastic water lines within 200 feet

If other pathways fail:

✗ plug all drinking and/or nondrinking water wells within 1000 feet

✗ excavate contaminated soil to the Tier 1 level

✗ institutional controls (page 5)

## Tier 2

Tier 2 is a bigger assessment, but often allows a higher target level because it depends on site conditions.

The main idea of Tier 2 is to

1. see how far contamination has spread ("define the plume"),
2. predict how far it will go ("simulate the plume"), and
3. calculate site-specific target levels (SSTLs).

1. In the example, we are only looking at groundwater to plastic water line pathway for Tier 2. More monitoring wells are needed to see how far benzene has spread to 290 ppb (Tier 1 level).

2. A formula is used to calculate how far contamination will go. Your consultant will put site measurements into the computer, such as how fast groundwater moves. The computer simulates the plume and prints a map to show its prediction.

3. The computer uses the same formula to calculate how much contamination can be left. But it starts with the allowable level at the plastic water line (290 ppb), and "back-calculates" a site-specific target level (SSTL) for the source.

## Risk Classification

The site is classified as high risk, low risk or "no action required" after Tier 2. Actually, each receptor is classified for risk. **Examples of receptors** include wells, basements, sanitary sewers, plastic water lines and streams.

**High risk:** generally, any actual receptor where contamination exceeds the site-specific target level (SSTL). (\*See diagram below.) Corrective action and monitoring are required for high risk receptors.

In our example, if the SSTL is 750 ppb, the site is high risk, because

there is more benzene (1,000.) than allowed (750).

**Low risk:** generally, any potential receptor where contamination exceeds the target level. Only annual monitoring is required for low risk receptors.

In our example, there is a potential for a plastic water line anywhere. No calculation is needed for an SSTL, because the Tier 1 level must be met at the maximum. Because our maximum (1,000 ppb) is more than 290 ppb, the potential plastic line is low risk. Annual monitoring is required until the utility company is notified.

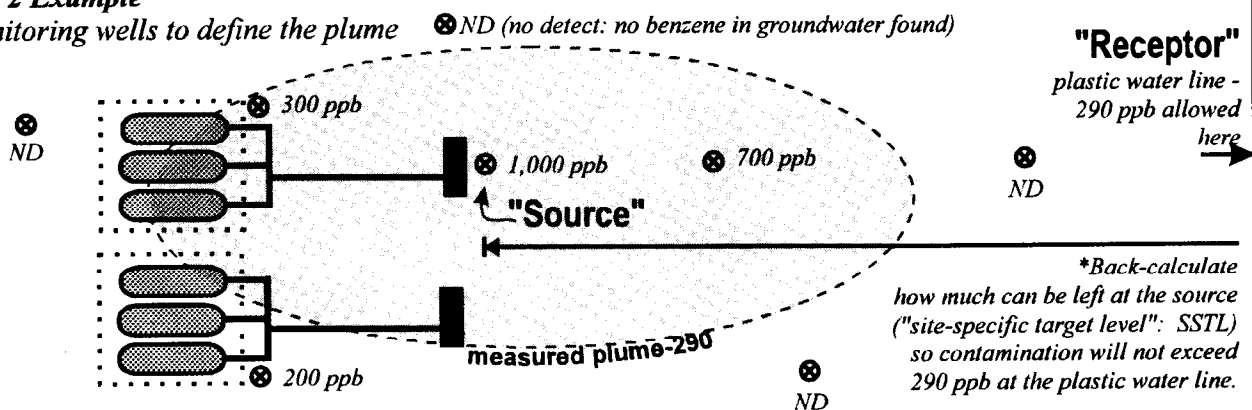
## Tier 3

Tier 3 is an even more extensive assessment than Tier 2. People usually go to Tier 3 if it appears to be cheaper to do more assessment than to take corrective action. Tier 3 requires an approved work plan by DNR.

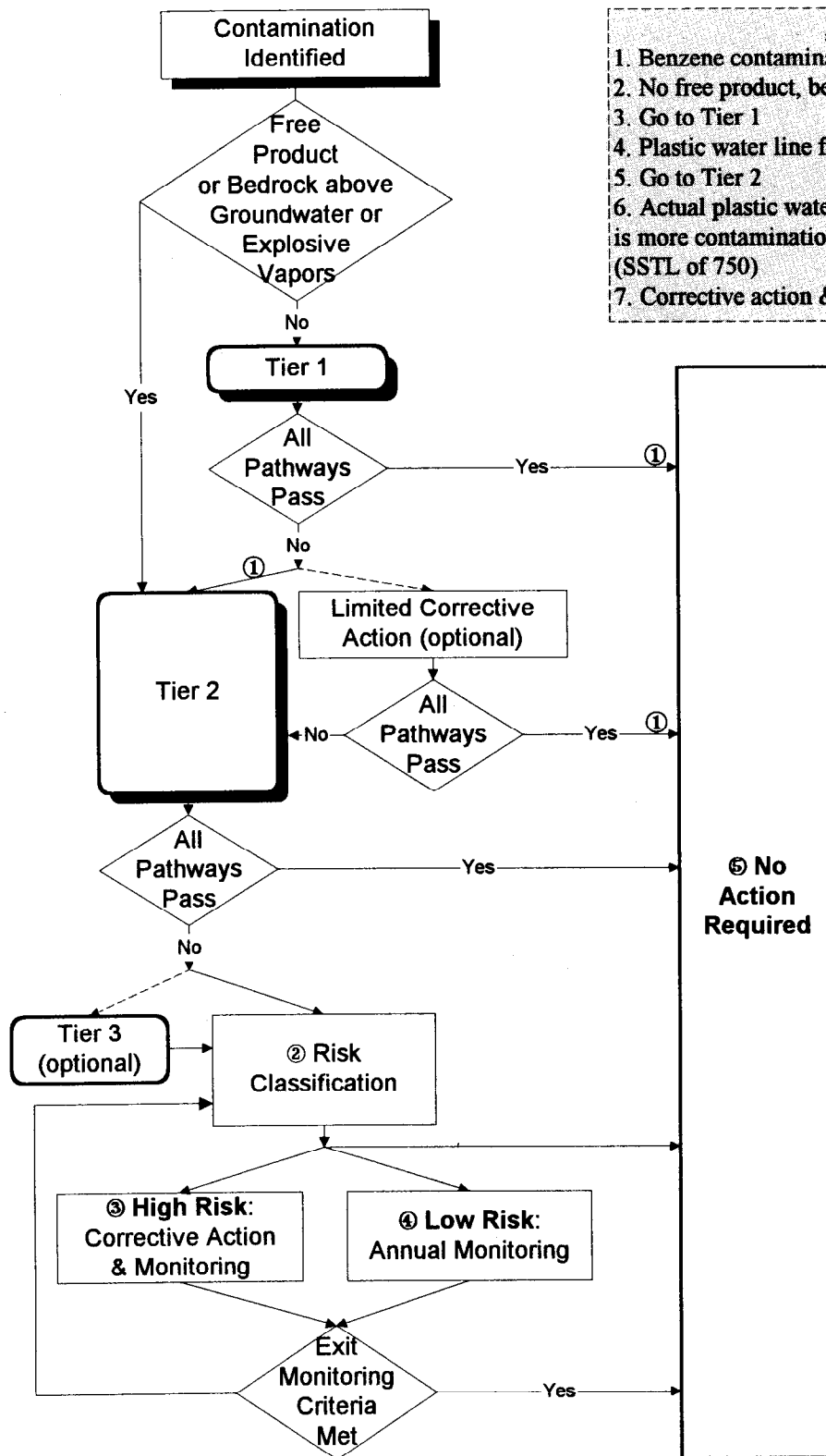
For example, a Tier 3 might be done to assess bedrock without piercing the bedrock (such as using electromagnetics) OR to justify that a deep well will not be impacted by contamination.

### Tier 2 Example

Monitoring wells to define the plume



# Iowa RBCA Overview



## Example:

1. Benzene contamination in groundwater
2. No free product, bedrock or explosive vapors
3. Go to Tier 1
4. Plastic water line fails
5. Go to Tier 2
6. Actual plastic water line: high risk because there is more contamination (1,000 ppb) than allowed (SSTL of 750)
7. Corrective action & monitoring required

## Reports

- ① Tier 1 Report
- ② Tier 2 or Tier 3 Report OR reclassification may be documented in a Site Monitoring Report
- ③ Corrective Action Design Report (CADR) before performing actions; and Site Monitoring Report (SMR) for annual monitoring and remediation monitoring.
- ④ Site Monitoring Report (SMR) for annual monitoring
- ⑤ Any request for classification as No Action Required must justify the classification through a report such as a Tier 1, Tier 2, Tier 3 or SMR

# Pathway Completeness and Receptors

| Pathway   | Tier 1   | Tier 2  |
|---|--|---|
| Groundwater Ingestion<br>- Drinking Wells               | Any drinking well within 1,000 feet of the source. This is an actual receptor where the <b>“actual”</b> row of Tier 1 Table applies.   | Actual receptor: Any drinking well within the actual or simulated groundwater plume   |
| Groundwater Ingestion<br>- Nondrinking Wells            | Any nondrinking well within 1,000 feet of the source. This is an actual receptor, but a potential for drinking, so standards in the <b>“potential”</b> row of Tier 1 Table apply.  | Actual receptor: Any nondrinking well within the actual or simulated groundwater plume  |
| Groundwater Ingestion<br>- Protected Groundwater Source | This is a <b>potential</b> receptor for drinking. If hydraulic conductivity (K) is 0.44 meters/day or greater, the area within 1,000 feet of the source is considered a protected groundwater source. If bedrock is above the shallowest groundwater, it is also a protected groundwater source. | Potential receptor: All of the area within the actual or simulated groundwater plume if $K > 0.44$ m/day; or if bedrock is above groundwater, all of the area within 1,000 feet.  |
| Groundwater Vapor<br>to Enclosed Space                  | This pathway is always complete at Tier 1, because all areas are potential receptors (unless no groundwater was encountered and drilling was deep enough).   | <i>Actual receptor:</i> any confined space within the actual or simulated plume. “Confined space”: basement in a building occupied by humans OR sanitary sewers.<br><i>Potential receptor:</i> area within the actual or simulated groundwater plume.   |
| Groundwater to<br>Plastic Water Line                    | <i>Actual receptor:</i> any plastic water main or service line within 200 feet of the source if the shallowest groundwater is less than 20 ft. deep.<br><i>Potential receptor:</i> area within 200 ft. of the source, but can “out” with notification to utility.                                | <i>Actual receptor:</i> any plastic water main or service line within the actual or simulated plume if the shallowest groundwater is higher than 3 ft. below the plastic water line.<br><i>Potential receptor:</i> area within the actual or simulated groundwater plume, but can “out” with notification to utility. |
| Surface Water   | <i>Actual receptor:</i> Any surface water (such as rivers, ponds or intermittent streams) within 200 feet of the source. Tier 1 levels apply only to designated use waters. Visual inspection applies to all surface water.<br><i>Potential receptor:</i> none.                                  | <i>Actual receptor:</i> Any designated use surface water within the actual or simulated plume. Must meet surface water criteria or acutely toxic levels — usually much higher than Tier 1 levels.<br><i>Potential receptor:</i> none.   |
| Soil Leaching to<br>Groundwater                         | Complete if any of the three groundwater ingestion pathways are complete.  | Complete whenever ANY groundwater transport pathway is complete.  |
| Soil Vapor to<br>Enclosed Space                         | This pathway is always complete at Tier 1, because all areas are potential receptors.  | <i>Actual receptor:</i> any confined space within 50 ft. of the soil plume. “Confined space”: basement in a building occupied by humans OR sanitary sewers.<br><i>Potential receptor:</i> area within 50 feet of the soil plume.  |
| Soil to Plastic<br>Water Line                           | <i>Actual receptor:</i> any plastic water main or service line within 200 feet of the source.<br><i>Potential receptor:</i> areas within 200 feet, but can “out” with notification to utility.   | <i>Actual receptor:</i> any plastic water line within 10 feet of the soil plume.<br><i>Potential receptor:</i> areas within 10 feet of the soil plume, but can “out” with notification to utility.  |

# How long do I have to monitor?

All sites classified high or low risk must be monitored at least annually. (High risk sites must also take corrective action and do remediation monitoring.)

## When can you stop monitoring?

When contamination is:  
less than target levels AND  
not spreading or getting worse  
("steady or declining")

What does that mean? Use the three most recent samples, taken at least six months apart. Let's take a look at a sample site with benzene in a protected groundwater source. This is the potential groundwater ingestion pathway.

## Less than target levels

If there are no institutional controls, a future drinking well could be put in the maximum contamination. So the target level for potential ingestion is the Tier 1 level. In the example below, IF there are NO institutional controls, the target level for the source monitoring well is 290 ppb.

If there were an institutional control on site to prohibit wells, then the Tier 1 level applies at the property line, not the maximum. A site-specific target level (SSTL) is calculated.

## Which monitoring wells?

**Source well:** the monitoring well with the maximum concentration.

**Transition well:** between the source

and each receptor; must contain some contamination to tell whether the plume is spreading or shrinking.

**Guard well:** between the source and each receptor; must be less than the target level.

## Steady or declining

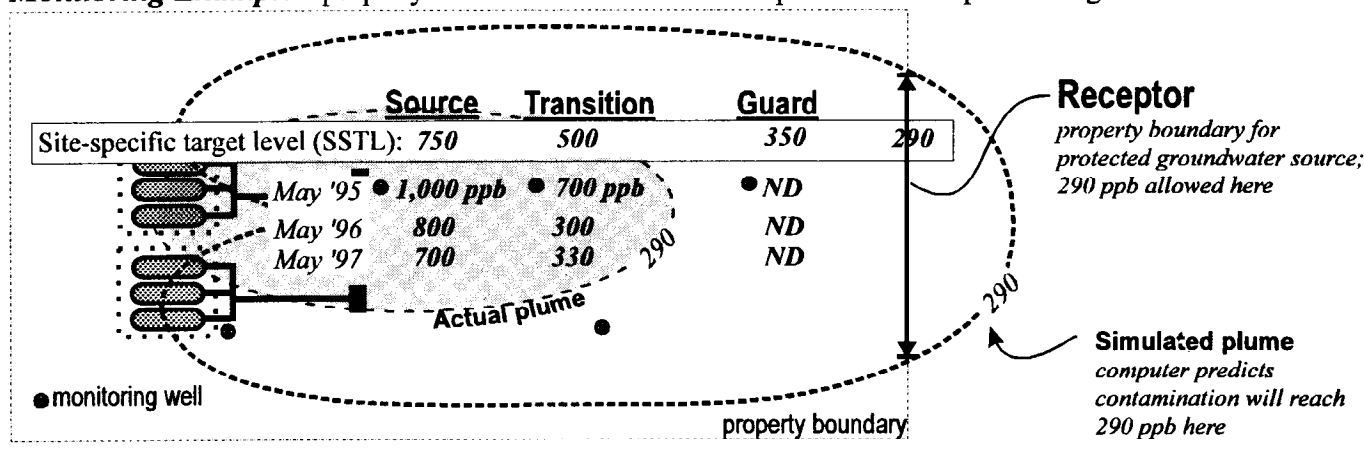
Did the example below meet the steady or declining criteria?

**Source:** Yes—last sample (700) was less than SSTL (750).

**Transition:** Yes—Last sample (330) also less than SSTL (500); levels can increase, but not more than 20% between any two samples. (300 to 330 is only 10%.)

**Guard:** Yes—"ND" means no detection of contamination.

**Monitoring Example:** property with institutional control to prohibit use of protected groundwater source



# Institutional Controls

An institutional control is a legal tool to restrict access or use of property to prevent exposure to contamination. [See Chapter 135.12(8).] Instead of reducing contamination to "get out", this removes the potential receptor (such as a drinking well or basement).

**To clear the potential groundwater ingestion pathway for protected groundwater:** Prohibit wells:

**For Tier 1:** within 1000 feet.

**For Tier 2:** (See example above.):

1. within the **entire** actual and simulated plume (on your property and your neighbor's property); OR
2. on your property and monitor till levels are less than the SSTL (750).

**To clear vapor pathways for potential receptors:**

**For Tier 1:** prohibit subsurface enclosed spaces within 500 feet.

**For Tier 2:** prohibit basements and/or sanitary sewers:

1. within the **entire** actual and simulated plume; OR
2. on your property and monitor till levels are less than the SSTLs.

**Examples of institutional controls:**

federal/state laws, city ordinance, or restrictive covenant running with the land & recorded at the county recorder

| Iowa Tier 1 Look-Up Table       |                                     |           |         |         |              |         |              |           |
|---------------------------------|-------------------------------------|-----------|---------|---------|--------------|---------|--------------|-----------|
| Media                           | Exposure Pathway                    | Receptor  | Group 1 |         |              |         | Group 2: TEH |           |
|                                 |                                     |           | Benzene | Toluene | Ethylbenzene | Xylenes | Diesel*      | Waste Oil |
| Groundwater ( $\mu\text{g/L}$ ) | Groundwater Ingestion               | actual    | 5       | 1,000   | 700          | 10,000  | 1,200        | 400       |
|                                 |                                     | potential | 290     | 7,300   | 3,700        | 73,000  | 75,000       | 40,000    |
|                                 | Groundwater Vapor to Enclosed Space | all       | 1,540   | 20,190  | 46,000       | NA      | 2,200,000    | NA        |
|                                 | Groundwater to Plastic Water Line   | all       | 290     | 7,300   | 3,700        | 73,000  | 75,000       | 40,000    |
|                                 | Surface Water                       | all       | 290     | 1,000   | 3,700        | 73,000  | 75,000       | 40,000    |
| Soil (mg/kg)                    | Soil Leaching to Groundwater        | all       | 0.54    | 42      | 15           | NA      | 3,800        | NA        |
|                                 | Soil Vapor to Enclosed Space        | all       | 1.16    | 48      | 79           | NA      | 47,500       | NA        |
|                                 | Soil to Plastic Water Line          | all       | 1.8     | 120     | 43           | NA      | 10,500       | NA        |

NA: Not applicable. There are no limits for the chemical for the pathway, because for groundwater pathways the concentration for the designated risk would be greater than the solubility of the pure chemical in water, and for soil pathways the concentration for the designated risk would be greater than the soil concentration if pure chemical were present in the soil.

TEH: Total Extractable Hydrocarbons. The TEH value is based on risks from naphthalene, benzo(a)pyrene, benz(a)anthracene, and chrysene. Refer to Appendix B for further details.

Diesel\*: Standards in the Diesel column apply to all low volatile petroleum hydrocarbons except waste oil.

*Don't risk not getting your tank tags*

## No Financial Responsibility?—No Tank Tags

Most UST owners and operators in Iowa comply with financial responsibility (FR) requirements (Chapter 136 of Environmental Protection rules). But some don't. FR includes insurance or other methods to pay the cost of cleaning up leaks and paying third parties for bodily injury and property damage caused by leaking USTs.

This year DNR sent letters to owners and operators (who already had been cited for not showing FR), saying they would not get annual tags until FR was demonstrated [based on 135.3(4)"e"].

The 1997 tags must be displayed on fill pipes of USTs by 4/1/97. Unless current tags are issued and displayed, it is illegal for anyone to deposit product.

**You must either demonstrate financial responsibility, or temporarily or permanently close your underground storage tanks.**

Being financially responsible protects owners and the public. Without coverage:

- ✗ owners or operators may be faced with high cleanup costs or lawsuits by third parties.
- ✗ cleanup activities may be delayed and contamination may spread, increasing the risk to the public and the environment.
- ✗ violators have an unfair advantage over owners who responsibly pay insurance premiums.

### Fines

Progressive fines will address the unfair economic advantage violators have over those who comply with the law. The fine will include, at a minimum, the amount of unpaid premium from 12/31/93 to the present. In many cases the fine could be in the range of \$6,000 to \$10,000.

Although DNR has denied tags for a small percentage of violators, we will continue to identify those who do not show FR. By Fall, a greater percentage of FR violators will be identified and will not get their 1998 tags. DNR will continue to focus on FR violations until compliance is achieved.

## Secondary Containment for Leak Detection

# Interstitial Monitoring

*This is fifth in a series of six articles on Leak Detection, including:*

1. Overview
2. ATG
3. SIR
4. Vapor Monitoring
5. Interstitial Monitoring
6. Piping Methods

### How does it work?

Secondary containment is a barrier between the tank and the environment with a leak detection device in-between. The barrier holds the leak so it can be detected and prevents it from contaminating the environment. Secondary containment is considered the most protective of the environment.

Barriers include:

- ✗ Double-walled or "jacketed" tanks
- ✗ Concrete vaults (lined or unlined)
- ✗ Internally fitted liners (bladders)
- ✗ Leak-proof excavation liners that partially or completely surround the tank

The most common method of secondary containment is installing a new double-walled or jacketed tank. You can retrofit an existing tank by fabricating a tank within the existing tank or by installing a bladder.

Excavation liners can only be installed during tank installation. The liner must direct a leak towards the leak monitor, be compatible with the product being stored, and not interfere with the tank system's cathodic protection system. Also, it must be above the groundwater and the 25-year flood plain, not be disabled by moisture from runoff or rainfall, and not allow product to pass through any faster than 10-6 cm/sec.

### Interstitial monitors

The space between the tank and outside barrier is called the interstitial space. It can be monitored for leaks using the following:

- ✗ Electrical conductivity
- ✗ Pressure sensing
- ✗ Fluid sensing
- ✗ Hydrostatic monitoring
- ✗ Manual detection
- ✗ Vapor monitoring

The **electrical conductivity** monitor depends on leaked product changing the resistance of sensing wires in the interstitial space. The leaked product completes an electrical circuit and activates an alarm.

**Pressure sensing** can be used only in double-walled tanks. The interstitial space is put under a vacuum or pressurized. Leaks are detected by a loss of vacuum or pressure.

**Fluid-sensing** systems are used in double-walled tanks to detect a leak in the normally dry interstitial space from product or groundwater.

The **hydrostatic** method is used in double-walled tanks with a fluid that completely fills the interstitial space. A leak is detected by a change in fluid level. A leak in the inner tank or outer wall causes fluid to leak into the tank or surrounding soil. In high

groundwater, groundwater will leak into the interstitial space causing a rise in fluid level.

**Manual** leak detection is simply using a pole with a cloth or petroleum-detecting paste on the end. The tank is made for the pole to reach the bottom of the interstitial space. Any leak can be seen on the cloth or in a paste color change.

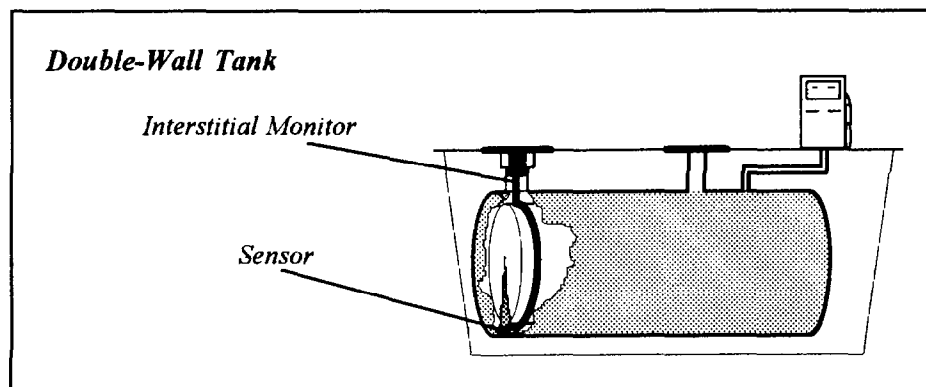
**Vapor monitoring** uses a vapor-sensing device lowered or permanently placed in the interstitial space to detect product vapors.

### Proper Installation

The biggest factor for whether secondary containment works well is its installation, operation and maintenance.

Hire only qualified, trained and experienced installers. After installation, the installer should train the tank operator on how to use and maintain the monitoring system. Be sure they can provide continuing support after installation.

Any leak detection system can only protect you from pollution liability if properly operated and maintained. Be sure your tank operator really understands the leak-sensing device for your system.



# At A Glance

UST: Underground Storage Tanks  
LUST: Leaking Underground Storage Tanks

## Who's Who:

**EPA:** (Environmental Protection Agency) a federal agency; sets national rules on USTs which DNR has adopted and enforces in Iowa.

**DNR:** (Department of Natural Resources) a state agency; responsible for administering the federal and state laws regulating underground storage tanks in Iowa.

**ICPUST Board:** (Iowa Comprehensive Petroleum Underground Storage Tank Board) a six-member board of state officials and citizen appointees; administers the state-subsidized UST Financial Responsibility Program in Iowa.

**Williams & Co.:** contractor hired by the ICPUST Board to manage the UST Financial Responsibility Program.

**GAB:** a subcontractor to Williams & Co. for screening and approving claims for payment from the UST Financial Responsibility Program.

*Regulatory  
agencies --  
work with  
this fund*



*Financial  
Responsibility  
-- work with  
this fund*



## Funding Help:

**LUST Trust Fund:** federal funds for operating DNR's regulatory program. Part may be used to pay to assess and clean up contaminated UST sites where a responsible party is unknown, unwilling, or unable to do so.

**UST Financial Responsibility Program or UST Fund or ICPUST Fund:** (Iowa Comprehensive Petroleum UST Fund) helps pay for assessments and cleanups, tank insurance, and loans for upgrading or replacing tanks. The ICPUST Board hired Williams & Co. to manage the UST Financial Responsibility Program.

## DNR Tanks Update

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